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| 10/762,179 | 01/21/2004 | Shahriar Vazan | D/A3412 | 4777 |

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| EXAMINER |
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PHAM, HAI CHI

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| ART UNIT | PAPER NUMBER |
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2861

DATE MAILED: 05/30/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|-----------------|-----------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/762,179 | VAZAN, SHAHRIAR | |
| | Examiner | Art Unit | |
| | Hai C. Pham | 2861 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 March 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5, 7-12 and 14-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 7-12 and 14-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

FINAL REJECTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 7, 14, 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Guerin (EP 0829933) in view of Konnunaho et al. (U.S. 6,603,498).

With regard to claim 1, Guerin discloses a raster output scanner having a VCSEL print head (42), which comprises a photoreceptor (photoreceptor 54), a linear array of vertical cavity emitting laser diodes ($d_1 \dots d_5$) as light sources to produce light beams directed to said photoreceptor, an integrated set of photodetectors (detector array $S_1 \dots S_5$), a beam splitter (plate 70) (Fig. 7) for deflecting the light beams emitted from the VCSEL light sources onto the detector array (the plate 70 allows 95% of the light beam to pass through and reflects the remaining portion of the light beam back toward the detector array) (col. 5, lines 25-35), and an array of feedback loops for simultaneously adjusting beam intensity using the drivers for each said light beam, wherein each of the drivers uses said photodetector array as a reference source to adjust for parallel beam to beam uniformity correction produced by said array of light sources (the photodetector receives the reflected light beam of the corresponding laser diode whose intensity is compared to a reference value to modify the output power of the corresponding laser

diode for exposing the photoreceptor) (col. 5, lines 53-57). With regard to claim 14, Guerin further teaches using either a one-dimensional array of VCSELs or a two-dimensional array of VCSELs as light sources provided with corresponding one-dimensional or two-dimensional detectors (col. 6, lines 19-26).

Guerin fails to teach the VCSEL drivers being programmable drivers, and the calibrated uniformity values corresponding to each light beam for a normal value of intensity on the surface of the photoreceptor.

Konnunaho et al. discloses an image forming apparatus for forming an image on the surface of the photoreceptor (drum 102), the apparatus comprising a linear array of individually addressable laser diodes (24) and a linear array of photodetectors (36), a programmable driver (driver ASIC 40) for modulating the current supplied to each of the laser diodes in the array so as to maintain the output power of the laser diodes at a uniform level (col. 4, lines 6-18), a calibration value for each of the laser diodes used to determined the same target or nominal output power of each of the light beams (26) emitted toward the photoreceptor (col. 4, lines 26-39).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to provide programmable drivers to independently drive each of the light emitting elements in the VCSEL array as well as the calibration value for each of the light emitting elements in the device of Guerin as taught by Konnunaho. The motivation for doing so would have been to keep the light output of the individual light emitting elements constant as suggested by Konnunaho.

The method claim 7 is deemed to be clearly anticipated by functions of the above structures.

3. Claims 2-4, 8, 10-11, 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Guerin in view of Konnunaho et al., as applied to claims 1, 7, 14 above, and further in view of Rajeswaran (U.S. 5,917,534).

Guerin, as modified by Konnunaho et al., discloses all the basic limitations of the claimed invention including using a memory for storing the calibration values for each of the lasers (Konnunaho et al., col. 4, lines 32-33) and a well known conventional method for correcting the non-uniformity of the output power of the individual light emitting elements, but fails to explicitly disclose the digital to analog converters, the coefficients values for compensating for aging effects.

Rajeswaran discloses an image forming apparatus having an LED print head comprising light-emitting diode arrays with integrated photodetector arrays disposed in a one-to-one relationship, and provided with an array of feedback loops for correcting the non-uniformity of the light output of each of the light-emitting diodes due to aging of the light-emitting diodes (col. 13, lines 23-61), the feedback loop including a digital to analog converter (61, Fig. 13) for converting the digital signal stored in the target data register (62) so as to control the current driver (65) to adjust the current to the LED (Fig. 13) (col. 9, line 55 to col. 10, line 11). Rajeswaran further teaches using register (LCU 175, Fig. 17) for storing the empirically determined correction values for the target data

Art Unit: 2861

to control the current driving the light-emitting diodes to compensate for the aging effects (col. 9, lines 29-54) (col. 13, lines 44-61).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to incorporate the digital to analog converters for converting the digital signal stored in the target data memory in the modified device of Guerin as taught by Rajeswaran. The motivation for doing so would have been to correct the non-uniformity of the light output of the light emitting diodes in real time.

4. Claims 5, 9, 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Guerin in view of Konnunaho et al. and Rajeswaran, as applied to claims 1, 7 above, and further in view of Kamimura (U.S. 6,266,077).

Guerin, as modified by Konnunaho et al. and Rajeswaran, discloses all the basic limitations of the claimed invention except for the correction values being mathematically derived.

Kamimura discloses a feedback loop control device for compensating the output variations in a printing head, which comprises an LED array (15), the feedback control loop including a non-volatile memory (13) for storing the coefficient values for correction based on the summation/average of the measured light output of the LEDs or a piecewise linear function (col. 6, line 65 to col. 7, line 9).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to use a linear transformation or a summation/averaging method to derive the coefficient values for correcting the non-uniformity of the light

Art Unit: 2861

output in the device of Guerin as taught by Kamimura. The motivation for doing so would have been to not only correcting the output variations of each of the light emitting diodes but also to uniformly control the light output across the entire set of the light emitting elements in the array.

5. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Guerin in view of Konnunaho et al., as applied to claim 14 above, and further in view of Kamimura.

Guerin, as modified by Konnunaho et al., discloses all the basic limitations of the claimed invention except for the correction values being mathematically derived.

Kamimura discloses a feedback loop control device for compensating the output variations in a printing head, which comprises an LED array (15), the feedback control loop including a non-volatile memory (13) for storing the coefficient values for correction based on the summation/average of the measured light output of the LEDs or a piecewise linear function (col. 6, line 65 to col. 7, line 9).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to use a linear transformation or a summation/averaging method to derive the coefficient values for correcting the non-uniformity of the light output in the device of Guerin as taught by Kamimura. The motivation for doing so would have been to not only correcting the output variations of each of the light emitting diodes but also to uniformly control the light output across the entire set of the light emitting elements in the array.

6. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Guerin in view of Konnunaho et al., as applied to claim 14 above, and further in view of Ema et al. (U.S. 6,118,798).

Guerin, as modified by Konnunaho et al., discloses all the basic limitations of the claimed invention except for the 8-bit digital to analog converter.

Ema et al. discloses a semiconductor laser control system for adjusting the light output of the laser used in a laser printer, the system including a feedback loop having a 5-bit digital to analog converter for correcting the drive current of the laser. Ema et al. further suggests increasing the number of bits of the digital to analog converter so as to obtain a higher accuracy.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to incorporate a high bit digital to analog converter in the control device of Guerin as taught by Ema et al. for the purpose of providing a highly accurate control system for adjusting the drive current of the light emitting diodes.

Response to Arguments

7. Applicant's arguments with respect to claims 1-5, 7-12 and 14-20 have been considered but are moot in view of the new grounds of rejection.

Conclusion

8. Applicant's amendment, which changed the scope of the base claims, necessitated the new grounds of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hai C. Pham whose telephone number is (571) 272-2260. The examiner can normally be reached on M-F 8:30AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vip Patel can be reached on (571) 272-2458. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2861

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



HAI PHAM
PRIMARY EXAMINER
May 24, 2006